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Assessment of the Influence of Biological Risk Factors on Household Fall Occurrence Amongst Elderly in Aba South Local Government Area of Abia State, Nigeria

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Abstract

This study was a cross-sectional descriptive survey that assessed the relationship between biological risk factors and household fall occurrence amongst the elderly in Aba South LGA, Abia State. It employed simple random sampling technique and a structured self-administer questionnaire was used to obtain data from three hundred and ninety (390) elderly aged sixty-five (65) and above. The findings showed that out of 390(100%), about 108(27.69%) of the respondents were males while 282(72.31%) were females. Majority of the respondents 197(50.51%) were between 65–74 years old, 131(33.59%) were between 75–84 years old while 62(15.90%) were 85 years and above. Most of the respondents 211(54.10%) are widowed while 179(45.90%) are married and all of the respondents have experienced fall

within the last six (6) months preceding the study. The criterion mean for this study was (2.5). Hence, weighted mean response equal to or above the criterion mean (2.5) indicates acceptance whereas weighted mean response below the criterion mean (2.5) denotes rejection. Specifically, the weighted mean response for biological risk factors like age, gender and disease conditions raised exceeded the criterion mean (i.e 4.00, 2.67, 4.00 > 2.5, respectively) In conclusion, the tested biological risk factors that proved to be significant for household falls occurrence amongst the elderly were age, gender, and disease conditions. Older adults should have adequate knowledge on fall risk factors as this will enable them to identify, abate and promote healthy behavior that aid fall prevention.

Keywords: Household Fall, Risk, Factor, Biological, Occurrence and Elderly

Introduction

According to World Health Organization (WHO, 2018) ^[19], worldwide, it's been calculable that 684 000 people die from falls annually of that over eightieth of fall-related fatalities happens in low and middle-income countries with those deaths inflicting falls to be the second leading reason behind accidental or unintentional injury deaths following road traffic injuries with usually, most of the fatal falls suffered by older adults of age sixty- (60) and above (WHO, 2018; Li, Hou, Zhao, Xie, Yi & Ding, 2023) ^[19, 10]. Fall poses great threat to the health of the elderly as it has become a major public health problem and is the second-leading cause of elderly morbidity as well as mortality worldwide. Fall results from an interactive and multiplex mixture of biological such as age, gender, malady condition and nationality. Nigeria just like other developing countries is faced with aging population that leads to increase in health and social care. Older adults are prone to fall because of high morbidity prevalence and age related physical as well as psychological changes in their lives Also, roughly thirty seven point three (37.3) million falls square measure fatal enough to need medical attention annually, that sort of falls account for over seventeen million disability-adjusted life years (DALYs) lost whereas nearly four-hundredth of the overall DALYs lost as a result of falls worldwide happens in youngsters, this measure might not accurately replicate the impact of fall-related disabilities for older adults which exactly have fewer life years to lose. Additionally, those people that fall and suffer incapacity, significantly the older adults, are at a significant risk for lengthy care and hospitalization (Zhang *et al.*, 2020 ^[22]; Zhang, Zhao, Wei, Han, Chen, Peng & Du. 2022; Li, Hou, Zhao, Xie, Yi & Ding, 2023 ^[10]). Fall-related injuries could be also fatal or non-fatal although majority of it are non-fatal. The impacts of falls are not confined to the individual but affect families and the community, however, the elderly may develop psychological problem like depression, anxiety and fear of falling (Alex *et al*, 2020; Zhang *et al.*, 2020) ^[1, 22]. The monetary expenses from fall-related injuries are quite weighty as fall injuries place great financial challenges on both the fall victim and their families, for instance, fall injuries cost about \$10 billion in the United States and \$570 million annually in the Netherlands (Florence, Bergen, Atherly, Burns, Steven & Drake, 2018) ^[4].

A fall can be described as an unexpected, unintentional modification in position resulting to a person landing at a lower level, on object, the floor, or the ground, as a result of unexpected onset of paralysis, convulsion, or overwhelming external force (Gale *et al.*, 2016; Oladele *et al.*, 2021) ^[5, 11]. The term "fall" means various things to various individuals (WHO, 2018) ^[19]. Most of the traumatic injuries-related hospitalizations are because of falls (Zhang *et al.*, 2022). Fall-related outcomes include; bruising, lacerations, fractures together with higher extremity, pain and hip fractures, and intracranial trauma in severe cases (Suleiman *et al.*, 2018; Alex *et al.*, 2020; Li *et al.*, 2023) ^[18, 1, 10]. Globally, falls are number one reason for morbidity and mortality among mature adults more so, the second leading reason for accidental or unintentional injury/death following road traffic injuries (WHO, 2018; Dokuzlar, Okudur, Smith, Soysal, Yavuz, Aydin & Isik, 2020) ^[19, 3]. Falls are typical pathological state amongst the senior in several communities. Falls cause hefty morbidity and mortality, hospitalization, loss of independence, poor quality of life, and early entry to long-term care facilities as well as have an effect on the standard of lifetime of several senior individuals (Zhang *et al.*, 2022). The factors associated with a larger risk of falls were: being older, being a female, widowed, uneducated, with difficulties in moving each arms, suffering house disorientation, high drug consumption, and balance impairment (Kim *et al.*, 2017; Dokuzlar *et al.*, 2020) ^[18, 3].

Biological Risk Factors Associated with Household Fall Occurrence Amongst Elderly

Biological factors embrace characteristics of people that are related to human body. Age, gender and race are non-modifiable biological factors.

1. Age

Age is one among the key risk factors for falls. Quite number of older population that fall suffer moderate to severe injuries like bruises, hip fractures, or head trauma (Xu *et al.*, 2016; Xie *et al.*, 2019) ^[21, 20]. Ageing is related to sarcopenia that's characterised by loss of muscle mass and strength as multiple factors underlie this method, loss of motor neurons and reduction of myofibrillar supermolecule synthesis seem to be major conducive factors (Zhang *et al.*, 2020; Lastrucci, Lorini, Rinaldi & Bonaccorsi, 2018; Gamage, Rathnayake & Alwis, 2019; Li *et al.*, 2023) ^[22, 9, 6, 10]. Age-related changes within the neural, sensory and contractor systems will result in impaired ability to keep up upright stance or react to an unforeseen loss of balance (e.g., a slip, trip or push). This risk level could also be partly because of physical, sensory, and psychological feature changes related to ageing, together with environments that don't seem to be tailored for aging population (Gamage *et al.*, 2019, Pellicer-Garcia, Antón-Solanas, Ramòn-Arubès, García-Moyano, Gea-Caballero & Juárez-Vela, 2020) ^[6, 14]. Older ages showed association with a better range of falls and a high risk of the event. The biological aging method contains structural and practical changes that continually accumulate. These alterations might compromise the performance of motor skills, hinder the individual's adaptation to the surroundings and dispose them to suffering falls. Advanced age is closely associated with predisposing factors for falls (Lastrucci *et al.*, 2018) ^[9].

2. Gender

Gender variations are determined across many populations, with most of studies detailing higher rates of falling in aged females than in aged male (Stevens & Sogolow, 2015 ^[17]; Hung, Wang, Tang, Chen, Peng, Hsiao & Chen, 2017 ^[7]; Zhang *et al.*, 2022). Females have higher tendency to fall than the males and sustaining of fracture (Shi *et al.*, 2016 ^[15]; Xie *et al.*; Li *et al.*, 2023 ^[10]), leading to doubly additional hospitalizations and emergency department visits than men. However, fall-related mortality disproportionately affects men (Li *et al.*, 2023) ^[10]. Additionally, women's muscle mass declines quicker than that of men, particularly within the immediate few years when climacteric, vital reduction in bone mineral density when climacteric has been often recommended to dispose females to a better risk of falling and bone fracture (Stevens & Sogolow, 2015; Carrasco, Tomas-Carus, Bravo, Pereira & Mendes, 2020; Li *et al.*, 2023) ^[17, 2, 10]. To some extent this can be gender-related as females are less possible to involve in the muscular building physical activity in their life course e.g., sports. Health seeking behaviour differs consistent with gender. Suleiman *et al.*, (2018) ^[18] in a study they conducted in Sharjah and Dubia, United Arab Emirates, explicit that their results indicated that females aged seventy years and higher are likely to fall than the male and younger females respectively. Male higher fatality rates is also due partially to the tendency of men not seeking medical aid till a condition becomes severe, leading to substantial delay to the access to hindrance and management of diseases.

3. Nationality or Race

Although the relationship between falls and nationality and race remains wide open for analysis, Caucasians living within the USA have higher risk of falling. Additionally, for each men and women, the speed of hospitalization for fall-related injuries is two to four times higher among the Whites than Hispanics and Asians/Pacific Islanders, and about twenty percent higher than African-Americans (Simona, Benjamin, Julie, Laura, Caroline, Stella & Chau, 2017). It's additionally clear variations determined between Singaporeans of Chinese, Malay and Indian ethnic origins, and between native Japanese older community dwellers and Japanese-Americans and Caucasians. Native Japanese folks have abundant lower rates of falls than Japanese-Americans and Caucasians (Simona *et al.*, 2017).

4. Disease Conditions

Parkinson's illness and other pathology (urinary incontinence, cataract, Dementia etc) were related to falls. Parkinson's illness could be a chronic and progressive pathology, characterised by the degeneration of neurons and difficulties in balance. Psychological feature decline is indicated as a variable that directly influences the chance of falls in older adults (Xu *et al.*, 2016; Alex *et al.*, 2020; Oladele *et al.*, 2021; Li *et al.*, 2023) ^[21, 1, 11, 10]. Pathology is powerfully associated with falls, fractures, and declining useful capability and quality of life. People with pathology might gift bodily property alteration, abnormal gait and body imbalance, which can result in the incidence of falls. Older adults in our study reported dizziness/vertigo. These changes are frequent in older adults and factors that incline them to the incidence of falls (Ouyang & Sun, 2018 ^[12];

Zhang *et al.*, 2022). In sum, several impairments, disabilities, and conditions like obesity, stroke and inflammatory disease, depression repeatedly are found to be related to the chance of falls within the aged. This risk seems to extend with the amount of risk factors someone has, so those persons possibly to fall is known (Sasidharan, Vijayakumar, Raj, Soman, Anony, Sudhakar & Kabali, 2020) [13]. Falls are recognized marker of frailty and quality impairment within the aged. Previous studies have established that disease conditions such as stroke, hearing impairment, impaired vision, poor body balance, cognitive impairment, dementia, arthritis, gait problems, obesity, heart disease, fracture, and osteoporosis are risk factors for falls in older adults globally (Alex *et al.*, 2020 [1]; Kyrdalen *et al.*, 2019; Chantanachai *et al.*, 2021, Srivastava, & Muhammad, 2022).

Methods

Study Design

This cross-sectional study conducted a random sampling of 390 elderly aged sixty-five (65) and above in Aba South Local Government Area, Abia State, Nigeria. The study aimed to provide evidence for the relationship between biological risk factors and household fall occurrence amongst elderly by analyzing epidemiological data such as socio-demographic characteristics and identifying the fall biological risk factors.

Sample Size

The sample size formula (Taro Yamane, 1974) for known population was used to derive the sample size to achieve a confidence level of 95% with a 5% margin of error and 50% prevalence.

Thus;

$$n = \frac{N}{1+N(e)^2}$$

Where;

n = Minimum sample size

N=Population size (15, 873)

e =margin of error (0.05)

In this case,

$$\frac{N}{1+N(e)^2}$$

$$\frac{N}{1+N(e)^2} = \frac{15873}{1+15873(0.0025)} = \frac{15873}{40.6825} = 390.1677$$

For more clarity and coverage, the figure was rounded up to 390 in order to give an adequate reflection of the study population.

Inclusion and Exclusion Criteria

The inclusion criteria is that you must be sixty-five (65) years and above, be resident of Aba South LGA and have experienced household fall within the last six (6) months preceding the study. The exclusion criteria, less than sixty-five (65) years, non-resident and not experienced household fall in the last six (6) preceding to the study.

Procedure

The research team was made up of one postgraduate student from Federal University of Technology Owerri and nine (9) research assistants. All the team members received training for the survey and familiarized with the process of the survey baseline, survey object clarification, content, aim and questionnaire outline as well as understanding the responsibilities to ensure great investigation quality. The assessment was done in the elderly homes as the researcher and her assistants filled the questionnaires with the respondents' answers.

Measures

A self-designed questionnaire was administered for a random sampling to evaluate the socio-demographic features such as age, gender, occupation, marital status, fall experienced within last six months preceding the study and biological risk factors like gender, age, disease conditions as well as nationality. A pilot survey was conducted by administering 20 copies of the questionnaires to the elderly in Umuahia North LGA, Abia State that were not part of the study sample but have similar characteristics with the study subjects. Trial test method was used for the survey, and this was achieved by administering first 20 copies of the questionnaire to the elderly. The reliability of the instrument was determined by using Cronbach's Alpha and was 0.846. The research assistants were also trained in data collection management and entry via this pilot study.

Method of Data Analysis

The data was collected with the aid of questionnaire and entered into computer software called Statistical Package for Social Sciences (SPSS version 23.0). It was analyzed using frequency, percentage and mean which are descriptive statistics while multiple regression analysis was the inferential statistics used to test the hypothesis at a significant level of 0.05. 390 questionnaires were distributed to the respondents which were returned, properly filled and found useful for the study, thus; giving 100% return rate. The generated data for the study were collated, organized and subjected to data analysis for different objectives and hypothesis set for the study.

Table 1: Demographic Characteristics of the Respondents (n=390)

	Options	Frequency	Percentage
Gender	Male	108	27.69
	Female	282	72.31
	Total	390	100
Age Range	65-74	197	50.51
	75 – 84	131	33.59
	85 and Above	62	15.90
	Total	390	100
Marital Status	Single	0	0.00
	Married	179	45.90
	Widowed	211	54.10
	Divorced/Separated	0	0.00
	Total	390	100
Occupation	Farmer	67	17.18
	Civil Servant	74	18.97
	Retiree	223	57.18
	Business	19	4.87
	Artisan	7	1.80
	Total	390	100
Fall Experience within last 6 months	Yes	390	100.00
	No	0	0.00
	Total	390	100

Source: Field Survey, 2023

Results

Table 1 above showed that out of 390(100%), about 108(27.69%) of the respondents were male while 282(72.31%) were female. Majority of the respondents 197(50.51%) were between 65–74 years old, 131(33.59%) were between 75 – 84 years old while 62(15.90%) were 85 years and above. Most of the respondents 211(54.10%) are

widowed while 179(45.90%) are married while none of the respondents 0(0%) is single or divorced/separated. Analysis of the occupation revealed that most of the respondents 223(57.18%) are retirees, 67(17.18) are farmers, 74(18.97%) are civil servants, 19(4.87%) are into business as 7(1.80%) are artisans. All the respondents 390(100%) have experienced fall within the last 6 months.

Table 2: Biological Risk Factors (n = 390)

S. No	Biological Risk Factors	SA 4	A 3	D 2	SD 1	Total	Mean	Remark
1	Age is a biological risk factor associated with household fall	390	0	0	0	1560	4.00	Agreed
2	Gender is a biological risk factor associated with household fall	79	161	92	58	1041	2.67	Agreed
3	Disease conditions is a biological risk factor	390	0	0	0	1560	4.00	Agreed
4	Nationality is a biological risk factor associated with household fall	0	0	96	294	486	1.25	Disagreed
Grand Mean							2.98	Agreed

Source: Field Survey, 2023; **Criterion Mean** = 2.5

The criterion mean for this study is 2.5. Hence, weighted mean response equal to or above the criterion mean (2.5) indicates acceptance region whereas weighted mean response below the criterion mean (2.5) denotes rejection region. The analysis on table 2 which seeks to investigate the biological risk factors associated with household fall occurrence among the elderly shows a grand mean of 2.98 which exceeded the criterion mean of 2.50. This gives the general conclusion that the respondents accepted some of the items as their opinion on the biological risk factors associated with household fall occurrence among the elderly. Specifically, the weighted mean response for some of the items raised exceeded the criterion mean (i.e., 4.00, 2.67, 4.00 > 2.5, respectively). Hence, the biological risk

factors associated with household fall occurrence among the elderly are age is a biological risk factor associated with household fall, gender is a biological risk factor associated with household fall, disease conditions is a biological risk factor and nationality is not a biological risk factor associated with household fall.

Hypotheses Testing

The following hypotheses were tested at a significance level of 0.05 to provide answers to the research questions.

H₀: Biological risk factor does not have any significant influence on household fall occurrence amongst the elderly in Aba South Local Government Area, Abia State.

Coefficients ^a					
	Model	Unstandardized Coefficients		Standardized Coefficients	t
		B	Std. Error	Beta	
	(Constant)	.438	.376		1.163
1	Age is a biological risk factor associated with household fall	.349	.063	.254	5.572
	Gender is a biological risk factor associated with household fall	.279	.065	.224	4.330
	Disease conditions is a biological risk factor	.108	.049	.114	2.214
	Nationality is a biological risk factor associated with household fall	.149	.038	.207	3.954

a. Dependent Variable: Household Fall Occurrence

The significant value of biological risk factors and household fall is 0.006 which is less than 0.05, we then reject null hypothesis and accept alternative hypothesis and conclude that biological risk factors has significant influence on household fall occurrence amongst the elderly in Aba South Local Government Area, Abia State.

Discussion

The findings of this study reveal that all the participants had suffered from household falls within six (6) months preceding to the study and it supports the assertion of Oladele *et al.* (2021) ^[11] who stated that feebleness, sarcopenia and poor coordination are linked to fall while ageing and that ageing brings about slower reaction time, impaired vision, poor gait as well as muscle strength reduction which cause the elderly to be inactive attributing to their risk of falls. Also, Li *et al.*, (2023) ^[10] in their review, stated that aging is attributed with loss of muscle mass, visual deficit and conditions like arthritis, hypertension, hypotension and age-related changes in the neural, sensory and musculoskeletal systems can lead to impaired ability to maintain upright stance or react to

sudden loss of balance. These are in harmony with this study because all the participants agreed that they fall easily and regularly than they did while younger. However, it was observed that the females were the highest participants in this study which is in consonance with the findings of Oladele *et al.* (2021) ^[11] in Ekiti State, Nigeria, Suleiman *et al.*, (2018) ^[18] in United Arab Emirates and Nirmala, Nirmala & Gayani (2019) in Southern Sri Lanka denoting the females as the most falling gender. Although the reason could be because women's muscle mass decline quicker than that of men, particularly within the immediate few years when vital reduction in bone mineral density during climacteric and females are less possible to engaging in muscular building activities like sports in their life course. In addition, the finding reveals that disease condition (arthritis, impaired vision, urinary in continence, obesity, hypertension, diabetics and so on) is a risk factor for household fall amongst the elderly, it is in agreement with the findings of Lastrucci *et al.* (2018) ^[9] in Italy and Berry & Miller (2008) and this could be because disease conditions are characterized by the degeneration of neurons and difficulties in balance which predispose the elderly to

falling. In contrast, finding of Simona *et al.*, (2017) who opined that Nationality/race is a risk factor for fall, the study disagrees that Nationality is a risk factor associated with household fall amongst the elderly. The findings of the study agrees with the findings of Goh, Singh, & Mesbah (2021), who carried out a study on fall awareness behaviour and its associated factors among community dwelling older adults using descriptive survey design and found out that household falls are associated with age, gender and health status which are biological risk factors.

The findings from the study further revealed conclusively through the hypotheses which was carried out at a significance level of 0.05 using multiple regression analysis that biological risk factor ($0.006 < 0.05$) has significant influence on household fall occurrences in Aba South LGA, Abia State. Therefore, fall awareness behaviour should be emphasized among older females, those with lower functional mobility, higher BMI and living alone and the elderlies should have adequate knowledge on risk factors, this will enable them to properly identify, abate and promote healthy behaviour that will aid in fall prevention.

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